

# Course Outline: Math 4/5/7300, Fall 2011

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In addition to the UT BlackBoard site for this course the main web page for this course can be found at <http://livetoad.org/>. Please check one or the other frequently for announcements, changes, due dates, solutions, scores, and other goodies.

## Calendar

<i>Labor Day</i>	Mon	5	Sep
Exam 1: Appendices A–D and Sections 1.1–1.6	Fri	23	Sep
<i>Fall Break</i>	Mon–Tue	17–18	Oct
Exam 2: Sections 2.1–2.5, 3.1–3.2	Fri	28	Oct
<i>Last Day to Withdraw</i>	Fri	28	Oct
<i>Veteran’s Day</i>	Fri	11	Nov
<i>Thanksgiving</i>	Wed–Fri	23–25	Nov
Exam 3: Appendix E and Sections 5.1, 5.2, 5.4, 7.1–7.4	Mon	12	Dec, 12:30–2:30

## Introduction

Welcome to Linear Algebra I! Linear algebra is a very interesting subject. It grew from humble beginnings: solving systems of linear equations in several variables. Linear algebra is easily the most widely applied subject in all of mathematics. Perhaps as much as 75% of applied mathematics is linear algebra. In order to be so useful it has developed a subtle and beautiful structure built axiomatically from vector spaces and linear transformations.

Linear algebra is also traditionally one of the courses where mathematicians begin to develop the skill of rigorous proof. In many modern curricula, including here at UT, there is now a bridge course between calculus and upper-level courses, designed specifically to develop techniques of proof. Our bridge course is Math 3190, which is the prerequisite for this linear algebra course.

Hence I assume that you have already learned the language of sets and functions, and to construct basic proofs, including proofs by induction and proofs by contradiction. Most of you will already had a low-level course in linear algebra, such as our Math 1890. However I *do not* take this material for granted. We will develop the basic concepts of linear algebra from scratch. We will do so axiomatically, so if you have had a lower-level course in linear algebra already you will be able to draw on that experience to test the axioms against familiar examples.

One of the main goals of this course is to learn clear exposition of mathematical ideas through proofs and counterexamples. We will also learn many fundamental computational techniques, including gaussian elimination, change of basis, and Jordan and rational canonical forms.

## Office hours

I have two offices: most of the time I am in UH 2040. I will be there Wednesdays 2:00–3:50. At these times you can call or stop by without an appointment. The phone there is 419 530 2138.

In addition I will be in UH 4080e for 1 hour before each class: Mondays, Wednesdays, and Fridays, 11:00–11:50. At these times you can call or stop by without an appointment. The phone there is 419 530 2568.

I am also available at other times, but for these you must make an appointment. Feel free to ask for appointments at other times if you cannot make it to my regular office hours. My email address is simply paul.hewitt@utoledo.edu, which is often the best way to contact me. If you call me when I am not in my office then you can leave a voice mail message and I will get back to you as soon as I can.

## Text and other resources

We will follow the book *Linear Algebra*, 4th edition, by Friedberg, Insel, and Spence. One important advantage of this text over some others is that for much of the book they develop linear algebra for an arbitrary field. This is important not only for wider applications but also because the necessarily more abstract treatment makes the fundamentals clearer. One drawback of the book is that it develops the important notion of *quotient space* through a series of exercises. We will pay close attention to the properties of quotient spaces.

For a secondary resource you may find helpful Bruce Cooperstein’s *Advanced Linear Algebra*. Cooperstein gives alternate proofs of many of the same results. You may occasionally find that his different approach makes some concepts a bit easier. This may especially be true with quotient spaces.

There are also many free online textbooks. One good one is at <http://joshua.smcvt.edu/linearalgebra/>. This book, by Jim Hefferson, is aimed at a lower-level course, such as our Math 1890. If you have already taken a lower-level linear algebra course you may find it helpful to review some of those topics.

## Exercises

There will be several exercise sets. I will post the problems and due dates as the semester progresses. Each problem will earn 0 points if your proof or calculation is mathematically incorrect; 1 point if it is correct, but not well-written; 2 points if it is correct and well-written. One of the main goals of this course is clear exposition of mathematical ideas.

Thus, your scores will not depend solely on your answer, but on the clarity and accuracy of your explanations. In fact, the answers you typically find “in the back of the book” are usually far too sketchy to earn you any points as written. You will not get credit for a solution if you are vague or if you omit important details. You must take note of this especially for True/False or other multiple-choice problems: you must support each answer with clear mathematical reasoning.

Before you turn in your homework, fold the papers lengthwise and write on the outside

*your name, Math 4300, Fall 2011, assignment number, due date*

## Plagiarism

I encourage you to work together. Studies show that students who work together consistently out-perform those who do not. However, your own work must be written in your own words. Do not “divide up the labor”. Do not turn in work that is not your own. Copying is cheating. This includes copying from another student or copying from a book. If you turn in work that is not your own then you will get a 0 on that assignment. If it happens a second time you will get an F in the course.

## Exams

There will be three exams, worth 100 points each. The exam dates are listed on the calendar above. Some of the exam questions will be multiple choice; some will be computational; some will require proofs.

I will give make-up exams only in case of a documented exigency, such as illness or a funeral. If you are sick the day of the exam then you must call or email that same day if you expect to be able to make up the exam. Otherwise you must arrange for a make-up exam ahead of time. If I am not in my office then you can leave a voice mail message. If you fail to show up for an exam and do not contact me about it until afterwards then you will not be able to make up that exam — you will get a 0 for that exam.

## Grades

Your final grade will be determined from your total points earned, based on the following scale:

- 90% earns an A
- 80% earns a B
- 70% earns a C
- 60% earns a D.

Faculty can no longer give an withdrawal. If you are still registered after the 10th week you will get a grade in this course, whether or not you have stopped attending.